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A CASE OF NON-MOSAIC ISODICENTRIC Y CHROMOSOME IN A MALE PATIENT WITH ADHD

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ABSTRACT

Background: Attention deficit hyperactivity disorder (ADHD) is a childhood neurological disorder more frequently seen in males. The genetics of ADHD is complex and inconclusive. Sex chromosomes are not frequently associated with behavioural disorders. Isodicentric Y chromosome though a relatively common anomaly is mostly mosaic and reported frequently in infertile males.

Case Description: A 16-year-old male with ADHD had presented to our hospital with complaints of having difficulty in coping up with academics at school. The patient showed a karyotype of non-mosaic 46,X,idic(Y)(q12).

Conclusion: This is a rare case of non-mosaic isodicentric Y chromosome seen in a phenotypically normal male patient with ADHD.

KEYWORDS: ADHD, Y chromosome, Isodicentric chromosome, Karyotype.

BACKGROUND:

Attention deficit hyperactivity disorder (ADHD) is a neurological developmental disorder amongst children and adolescents. The common features include hyperactivity, impulsivity, attention deficit, poor interpersonal relationships and easy distractibility that results in poor performance in academics. Prevalence of ADHD among Indian population has been found to be 7.1 %. The incidence was found to be more in males (9.4%) than females (5.2%). This forms a considerable burden of ADHD in Indian population.

Sex chromosomes are relatively rarely associated with behavioural disorders. Isodicentric Y chromosome is a common structural anomaly of Y chromosome encountered in infertile males and rarely associated with ADHD

We report a case of ADHD with non-mosaic Isodicentric Y chromosome.

CASE DESCRIPTION:

A 16-year-old patient came to the paediatric OPD with complaints of hyperactive and repetitive behaviour. He was born to unrelated parents. The parents gave history of normal birth with age appropriate milestones till 1 year of age after which the child started showing delayed development, loss of speech and hyperactive behaviour. They gave history of aggressive behaviour as well. There was no family history of ADHD. The boy was found to be phenotypically normal after endocrinology assessment by the paediatrician. The couple has another younger child who is normal.

They did not consult any doctor for ADHD and continued to take homeopathic medicine. They sought medical attention now as the repetitive behaviour was persistent and the child started having difficulties in academics.
The paediatrician referred the patient for genetic testing.

MATERIAL AND METHODS:

Informed consent was obtained for Cytogenetic analysis on peripheral blood cells. Chromosome analysis was done using GTG banding technique with a resolution of 220nm. Two cultures were performed. 56 metaphase chromosomes were captured, out of which 22 were analysed. 12 metaphase chromosomes were karyotyped.

MRI imaging of the brain was done using T1 T2W, FLAIR, SW1 & DW sequence done in axial, sagittal and coronal plane using 3.0 Tesla scanner.
Thyroid hormones were analysed on automated analyser Cobas 6000 by Roche diagnostics.

DISCUSSION:

The prevalence of ADHD is found to be 7.1 % with 1.8:1 male to female ratio in Indian population. Several genes have been studied to understand the etiology of ADHD but have proved inconclusive. The genetics of ADHD is yet to be unravelled further.

Presence of dicentric chromosome is the most common structural aberration of the Y chromosome. Majority of the patients with dicentric Y chromosome have a mosaic karyotype mostly with 45 X cell line. This is because of their mitotic instability and loss during development. Patients with isodicentric chromosomes wary widely in their phenotypic expression from infertility in males to turner's syndrome in females, gonadal dysgenesis , short stature and ambiguous genitalia.

Isodicentric Y chromosome have mostly been studied in azoospermic males. Sex chromosomes are relatively rarely shown to be associated with behavioural disorders.

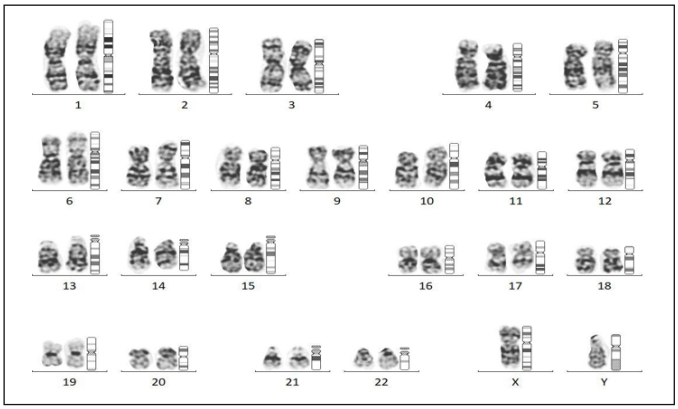
In this patient, the Thyroid profile was non-significant. TSH 2.66 uIU/mL (0.22-4.4 uIU/mL), free T3 6.04 uIU/mL (3.1-6.8 uIU/mL) and free T4 10.69 uIU/mL (12-22 uIU/mL). Brain MRI showed no significant abnormality.

Cytogenetic analysis identified 46 chromosomes with normal X chromosome and an isodicentric Y chromosome (46, X,idic(Y)(q12) (Figure 1). No other chromosomal abnormalities were observed. To the best of our knowledge, only one previous study discusses ADHD and Y chromosome abnormality. We did not do further testing using Florescent in situ hybridization (FISH) due to resource limitation.

CONCLUSION:

We report a rare case of non-mosaic isodicentric Y chromosome seen in a phenotypically normal male patient with ADHD. Y chromosome genes may contribute to the risk of ADHD. A long-term follow-up would be needed to see if this chromosomal abnormality presents with further clinical features.

Clinical Significance: This case may contribute to understanding the genetics of ADHD.



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